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My Robot, Myself

Body Re-engineering Leaps Toward the Future

By Belle Waring

Science is the superhero in this story. A recent Staff Training in Extramural Programs (STEP) forum in Lister Hill Auditorium invited experts in engineering, neurobiology and surgery to discuss progress in robotics, brain-machine interfaces and powered prosthetic limbs.

The cool factor was off the charts. Some highlights:

Building neurons in silica. To make fully neurally integrated prosthetics, said engineer Dr. Ralph Etienne-Cummings of Johns Hopkins University, we need to link thoughts to actions, sensors to feelings and to let the brain know where limbs and joints are in space.

“We are working towards...machines

SEE **ROBOTICS**, PAGE 6



Dr. Ralph Etienne-Cummings of Johns Hopkins



Dr. Lydia Villa-Komaroff

Women's History Month

Villa-Komaroff Celebrates a Life in Science

By Dana Steinberg

“There’s nothing as thrilling as getting up one morning, going into the laboratory and, in my case, opening an incubator and taking out a plate and realizing that you have something that nobody else has and nobody else knows,” said Dr. Lydia Villa-Komaroff at a recent lecture in observance of Women’s History Month. “I’ve had a couple of those moments and that’s a great gift.”

SEE **WOMEN'S HISTORY**, PAGE 4

Micro-Utopia, Anyone?

Fredrickson Describes Nourishing Power Of Small, Positive Moments

By Ellen O'Donnell

In order for human beings to flourish, Dr. Barbara Fredrickson argues, we need to get essential daily nutrients—not only from food, but also from a laugh, a hug or even a smaller moment of positive emotion, especially with someone with whom we click.

Fredrickson spoke recently in Lipsett Amphitheater as part of NCCAM’s Integrative Medicine Research Lecture Series. Her topic was positivity, which can be defined as emotional states that carry a pleasant subjective feel. She is a Kenan distinguished professor of psychology at the University of North Carolina, director of the university’s



Dr. Barbara Fredrickson

SEE **FREDRICKSON**, PAGE 8



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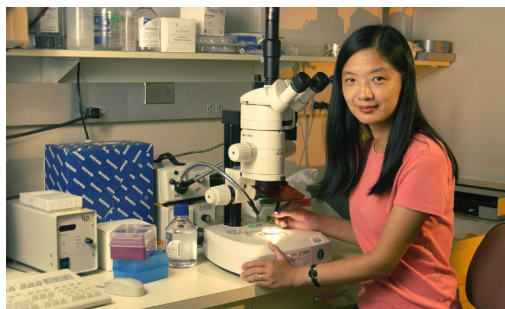
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NIH...Turning Discovery Into Health

briefs



Dr. Yingzi Yang of NHGRI will give the keynote lecture at NIH's observance of Asian-American Pacific Islander Heritage Month.

Asian-American Heritage Program Features NHGRI's Yang

NIH will hold its 2013 Asian-American Pacific Islander Heritage Month observance on Thursday, May 16, from 11:30 a.m. to 12:30 p.m. in Lipsett Amphitheater, Bldg. 10. This year's national theme is "Building Leadership: Embracing Cultural Values and Inclusion." The theme provides an opportunity for the NIH community to celebrate the achievements of Asian American and Pacific Islanders and their roles in science and research.

The keynote speaker is Dr. Yingzi Yang, head of the developmental genetics section at the National Human Genome Research Institute. An internationally recognized molecular biologist, Yang has performed groundbreaking research on skeletal development of vertebrate animals. Her presentation is titled "Cell Signaling in Skeletal Development and Disease."

Other program participants include NIH principal deputy director Dr. Lawrence Tabak, NHGRI deputy scientific director Dr. Paul Liu, NLM scientific review officer Dr. Zoe Huang and Debra Chew, director, NIH Office of Equal Opportunity and Diversity Management.

The event will be videocast at <http://videocast.nih.gov/>. Sign language interpreters will be provided. For more information or reasonable accommodation, contact Tyrone Banks by email bankst@nih.gov, phone (301) 451-9692 or via Federal Relay Service 1-800-877-8339.

Supply Center Holds Spring Showcase

The NIH Supply Center will sponsor its Spring Product Showcase on Tuesday, May 14 in the south lobby of Bldg. 10 from 9:30 a.m. to 2 p.m. Vendors will offer specials and promotions on products carried in the Self Service Stores as well as with the NIH Supply Center that will be available for same-day or next-day delivery.

You will have the opportunity to learn about new products that are part of the NIHSC stock and to suggest any new products you would like to see carried in stores. Refreshments will be served. For more information, email Gwendolyn.carr@nih.gov or Alicia.Boglin@nih.gov.

Visit the NIH Self Service Stores: Bldg. 10 (B2B41) and Bldg. 31 (B1A47), open Monday through Friday from 8 a.m. until 4:15 p.m. For special assistance, email nihsupplycenter@od.nih.gov or call (301) 496-3517.

Ethnic Food Fair, May 22

Enjoy a sampling of Asian cuisines at the Ethnic Food Fair being held on Wednesday, May 22 from 11:30 a.m. to 1:30 p.m. at Bldg. 31A's patio.

This annual celebration of food, culture and community is sponsored by the NIH Asian & Pacific Islander American Organization (APAO). Area restaurants will have food for sale. Learn about organizations and activities that promote diversity and inclusion at NIH. APAO will donate a portion of the proceeds to the Children's Inn at NIH; participants are encouraged to make contributions, too.

Every year in May, activities across the nation are organized to observe Asian-American Pacific Islander Heritage Month. For more information contact Aaron Bell, (301) 451-7898 or bella@mail.nih.gov.

Children's Inn Opens Park, Playground

The Children's Inn at NIH welcomes all NIH staff to a grand opening celebration of its new park and playground on Wednesday, May 22 from 3 to 7 p.m.

Under construction for the past year, the park and playground offers children of all ages—and grown-ups too—a place to relax and recharge. Features include: play area for youngsters ages 2-5 with life-size animals; play area for older children with a climbing boulder; a putting green for kids of all ages; Benjamin's tree house; whimsical 10-foot-high steel giraffes.

A standout in the park, visible from the inn's front entrance, is a 10-foot-wide "Spirit Nest," woven together with recycled eucalyptus branches. A family of 4 can easily nestle inside and a small family of birds has already made a home among the branches.

Once the park and playground is open to residents, the inn asks all NIH'ers to respect the safety and privacy of inn residents. Many of the children have seriously compromised immune systems.

nih record

Johnson To Give Mendelson Lecture, May 21

Dr. Bankole Johnson will deliver the 2013 Jack Mendelson Honorary Lecture on Tuesday, May 21 at 1:30 p.m. in Lipsett Amphitheater, Bldg. 10. The title of his talk is "Personalizing the Treatment of Alcoholism."



Johnson is a pioneer in the development of medications to treat alcohol dependence. His research has transformed our understanding of how functional and structural abnormalities at the molecular level in the brain can promote addiction.

Johnson discovered that ondansetron, a serotonin antagonist often used to curb nausea and vomiting caused by chemotherapy, is particularly effective at helping early-onset alcoholics reduce their drinking. In another study, he determined that the anti-seizure drug topiramate can also help treat alcohol addiction.

A native of Nigeria, Johnson pursued his medical degree at the University of Glasgow in Scotland and trained in psychiatry at the Royal London, Maudsley and Bethlem Royal Hospitals in England. In 2004, he was named the Alumni professor and chairman of the department of psychiatry and neurobehavioral sciences at the University of Virginia, where he is also a professor in the department of neuroscience and the department of medicine.

NIAAA established the lecture series as a tribute to Dr. Jack Mendelson, who made remarkable contributions to the field of clinical alcohol research. Each spring, the series features a lecture by an outstanding alcohol investigator whose lifetime of clinical research has substantially advanced our understanding of alcohol susceptibility, alcohol's effects on the brain and other organs and the prevention and treatment of alcohol use disorders.

NEI Global Health Lecture Looks at Genetic-Epidemiological Studies

The National Eye Institute Global Health Vision Lecture will feature NEI's Dr. J. Fielding Hejtmancik and Prof. Govindasamy Kumaramanickavel (Kumar) of Aditya Jyot Eye Hospital, India. The lecture will take place on Thursday, May 16, at noon at Lawton Chiles International House (Bldg. 16).

Developing countries present unique advantages for carrying out genetic and genetic-epidemiological studies.

Hejtmancik and Kumar will explain how these studies can increase our knowledge of the genetic epidemiology of specific diseases in the populations being studied as well as of the diseases and genes themselves. Examples will be given from both Mendelian and complex ophthalmic genetic diseases in India, including congenital and age-related cataracts, primary open angle glaucoma and diabetic retinopathy.

Hejtmancik is chief of the ophthalmic molecular genetics section, Ophthalmic Genetics and Visual Function Branch. Kumar was a Fogarty visiting associate in 1997-1998 and was trained by Hejtmancik. Currently he is research director at two premier ophthalmic institutions of India: Narayana Nethralaya, Bangalore, and Aditya Jyot Eye Hospital, Mumbai.

The Global Health Vision Lecture Series is sponsored by NEI, Fogarty International Center and the NIH global health interest group. NEI created the series in 2012 to foster global collaboration and the exchange of information among international vision researchers and eye health clinical scientists.

For information about the lecture, contact Sandra Jones at (301) 496-2234.

Individuals with disabilities who need sign language interpreters or reasonable accommodation to participate in this event should contact Linda Huss at (301) 496-5248.



Prof. Govindasamy Kumaramanickavel (Kumar) (l) and Dr. J. Fielding Hejtmancik



Woo To Give NINR Director's Lecture, May 21

Dr. Mary Woo will give the 2013 NINR Director's Lecture on Tuesday, May 21, at 10:30 a.m. in the Clinical Center's Lipsett Amphitheater. A well-known cardiovascular researcher, she will discuss brain-heart interactions in a lecture titled "It's All in the Mind: Heart Failure and the Brain."

Woo is a professor at the University of California at Los Angeles School of Nursing. She is also a fellow of the American Heart Association (AHA) and the American Academy of Nursing. She has published widely in the area of cardiovascular disease.

Among other awards, Woo was recognized as a "Pillar of Cardiovascular Nursing Research" by the AHA Council on Cardiovascular Nursing.

The NINR Director's Lecture is an annual event, designed to bring the nation's top nurse scientists to NIH to share their work and interests with a trans-disciplinary audience. The lecture began in 2011 as part of the observation of the institute's first 25 years at NIH.

WOMEN'S HISTORY

CONTINUED FROM PAGE 1

Villa-Komaroff (fourth from r) is joined by special guests at her talk: members of the Society for Advancement of Chicanos and Native Americans in Science. SACNAS members are (from l) David Soto Pantoja, Leonardo Mariño-Ramirez, Erika L. Barr, Tamara James, Pamela Tamez, Rocio Benabentos, Shauna Clark and Natasha Lugo-Escobar.

PHOTOS: BILL BRANSON



One day, back in 1978, she and her colleagues made a medical breakthrough. They had cloned insulin, the first time a human hormone was cultivated from bacteria. On that day, she excitedly told a colleague she had wonderful news. He immediately guessed, "You're pregnant?" Villa-Komaroff's story illustrates a challenge faced by many professional women. But men and women both make such assumptions, she said, because we tend to "think in our tribes." She advised listeners to consciously prevent such instant reactions and bias.

In his welcome, NIH principal deputy director Dr. Lawrence Tabak called Villa-Komaroff "a scientific trailblazer whose accomplishments span the entire gamut of scientific excitement and discovery from lab to academia into the corporate world."

A renowned molecular biologist, Villa-Komaroff spent two decades in academia, including teaching and research positions at Harvard, Northwestern and Children's Hospital in Boston. In 2006, she entered the private sector. At Cytochrome/ST, where she is chief scientific officer, the company is developing an optical cell sorter

that supports rapid, sterile selection of human cells, which will enable the development of new cell therapies.

While many women have made great scientific strides, women remain underrepresented in science and technology, said Tabak. He cited public perception as a

barrier. If it's true that women entering science goes against the social norm, he said, then we must change that philosophy and provide more opportunities. "It's about getting the best and brightest here so we can succeed in our mission as an agency."

"Why we continue to allow the media and society to tell girls it's better to be a princess than a physicist just baffles me," said Dr. Sharon Milgram, director of NIH's Office of Intramural Training and Education. "Everybody should have the right to pursue their dreams independent of bias and stereotypes."

As a Mexican-American woman who has had




Villa-Komaroff says that career options within science are boundless.

to overcome societal obstacles to attain her professional goals, Villa-Komaroff has proven that career options within science are boundless. "When one gets a Ph.D. in a particular discipline...that is a degree that opens worlds and is as spectacular a training for a number of different ways in which one can interact with the world," she said.

One rewarding aspect of science is the discovery phase, what Villa-Komaroff called "the joy of the search." She has touched countless lives with her insulin-cloning discovery. People with diabetes use recombinant insulin made based on techniques she and her colleagues developed decades ago. But even research that doesn't immediately have practical implications, she said, "expands the realm of possible for all of us."

Villa-Komaroff also found great reward teaching and in administration where she helped to set policy and distribute resources. While she has held various leadership roles, her lab work taught her vital lessons. "One of the hallmarks of science is it's not how senior you are, it's about how much experience you've had," she said. "You have to do the experiments...and you have to think for yourself."

Can young women have it all? There are tradeoffs, said Villa-Komaroff, and we must make choices. "This is not a function of science but a function of life. Decide what it is you want to do, then figure out how to do it." She also described how her connections helped facilitate her move into the corporate world. "Your network is with you forever," she said. "Keep that list."

The seminar, "From Cloning to Cell Therapy: A Life in Science," was sponsored by the Office of Equal Opportunity and Diversity Management. 

NIH Researchers Identify Pathway that May Protect against Cocaine Addiction

A study by researchers at NIH gives insight into changes in the reward circuitry of the brain that may provide resistance against cocaine addiction. Scientists found that strengthening signaling along a neural pathway that runs through the nucleus accumbens—a region of the brain involved in motivation, pleasure and addiction—can reduce cocaine-seeking behavior in mice.

Research suggests that about 1 in 5 people who use cocaine will become addicted, but it remains unclear why certain people are more vulnerable to drug addiction than others.

“A key step in understanding addiction and advancing treatment is to identify the differences in brain connectivity between subjects who compulsively take cocaine and those who do not,” said Dr. Ken Warren, acting director of the National Institute on Alcohol Abuse and Alcoholism. Researchers at NIAAA conducted the study.

“Until now, most efforts have focused on finding traits associated with vulnerability to develop compulsive cocaine use. However, identifying mechanisms that promote resilience may prove to have more therapeutic value,” said the paper’s senior author, Dr. Veronica Alvarez, acting chief of the section on neuronal structure in NIAAA’s Laboratory for Integrative Neuroscience. The study appeared in *Nature Neuroscience*.

Anti-HIV Therapy Appears to Protect Children’s Hearts, NIH Study Shows

For children who have had HIV-1 infection since birth, the combination drug therapies now used to treat HIV appear to protect against the heart damage seen before combination therapies were available, according to researchers in an NIH network study.

In the early 1990s, children with HIV were not treated with anti-HIV therapy or were treated with only one drug. In recent years, children, like adults, have been treated with combinations of three or more anti-HIV medications. This combination approach is called highly active antiretroviral therapy, or HAART.

Before the widespread use of HAART, many children with HIV had chronic heart disease. In fact, heart failure was the underlying cause of death for 25 percent of HIV-infected children who died after age 10. However, doctors knew little about whether combination anti-HIV drug therapies could affect the heart. In this study, researchers examined heart structure and function of more than 500 children born to HIV-infected mothers. They then compared the data with results from an NHLBI-sponsored study of HIV-infected children, conducted in the 1990s.

“NIH has been committed to investigating the effects of HIV and its treatment on the heart,” said study co-author Dr. Rohan Hazra of the Maternal and Pediatric Infectious Disease Branch, NICHD, one of 10 NIH institutes or offices that supported the study. “Our study indicates that anti-HIV medication may protect the heart.”

The findings appeared online in *JAMA Pediatrics*.

Suppressing Protein May Stem Alzheimer’s Disease Process

Scientists funded by NIH have discovered a potential strategy for developing treatments to stem the disease process in Alzheimer’s disease. It’s based on unclogging removal of toxic debris that accumulates in patients’ brains, by blocking activity of a little-known regulator protein called CD33.

“Too much CD33 activity appears to promote late-onset Alzheimer’s by preventing support cells from clearing out toxic plaques, key risk factors for the disease,” explained Dr. Rudolph Tanzi of Massachusetts General Hospital and Harvard University. “Future medications that impede CD33 activity in the brain might help prevent or treat the disorder.”

Tanzi and colleagues reported their findings Apr. 25 in the journal *Neuron*.

“These results reveal a previously unknown, potentially powerful mechanism for protecting neurons from damaging toxicity and inflammation,” said NIMH director Dr. Thomas Insel. “Given increasing evidence of overlap between brain disorders at the molecular level, understanding such workings in Alzheimer’s disease may also provide insights into other mental disorders.”

Variation in the CD33 gene turned up as one of four prime suspects in the largest genome-wide dragnet of Alzheimer’s-affected families, reported by Tanzi and colleagues in 2008. The gene was known to make a protein that regulates the immune system, but its function in the brain remained elusive. To discover how it might contribute to Alzheimer’s, the researchers brought to bear human genetics, biochemistry and human brain tissue, mouse and cell-based experiments. ①



For children who have had HIV-1 infection since birth, the combination drug therapies now used to treat HIV appear to protect against the heart damage seen before combination therapies were available.



ROBOTICS

CONTINUED FROM PAGE 1

Above:

The STEP panel includes Dr. Andrew Schwartz (l), Dr. Todd Kuiken (c) and Etienne-Cummings.

Below:

Schwartz discusses high-performance neural prosthetics, including robotic arms set in motion by thought.

PHOTOS: ERNIE BRANSON

whose signaling and encoding are no different from what you find in the brain itself," said Etienne-Cummings. "For that we have to go and look at nature and how it's constructed."

How do you make a processing system to serve in a living body? The brain is not a simple organ. It has 100 billion neurons and each neuron can have 1,000-10,000 synapses—the connections between neurons. The nervous system uses electrical energy in "nerve impulses" to transmit messages from one cell to another.

Nerve cells operate using ions, which are electrically charged atoms. These move from inside the cell to outside the cell to generate these impulses.

To decode information for use in the body, mechanical layers were lab-created to mimic how nerve cells let ions flow. Thus an analog of neurological tissue was born.

"This is how we build computers that speak the same language as [the] brain," said Etienne-Cummings. His audio track of peripheral touch fibers returning data to central processing sounded like percussion in a techno band.

The brain's complexity cuts against quick results. This also applies to the eye, which is an elegant extension of the brain. Yet a prosthesis for the retina, the specialized tissue in the back of the eye, has already been FDA-approved. This artificial retina can help patients see, although not perfectly. A normal eye can see through sunglasses without a hitch, but no retinal prosthesis can do that. Not yet. In rat models, work on an upgrade is in process.

Turning to spinal circuits, "neurons below an injury are okay; they just can't communicate with the brain," said Etienne-Cummings. "We need a gait control system." In a cat temporarily paralyzed by anesthesia, locomotion was restored with the help of a customized backpack.

"The cat walks a kilometer on a treadmill," said Etienne-Cummings. "It's unprecedented."

High-performance neural prosthetics. Of the 54 million Americans with disabilities, more than 1.6 million are living with limb loss, caused by disease or trauma. By November 2012, U.S. armed service members wounded in Iraq and Afghanistan numbered more than 1,500 amputees. Hundreds of those suffered multiple limb amputations. Body armor saves the core, but not the limbs.

"The primate hand is amazingly complicated," said neurobiologist Dr. Andrew Schwartz of the University of Pittsburgh. Fingertips are packed with nerve endings, and with its opposable thumb the hand can manipulate a world of objects. Hands also have the body's greatest positioning ability. Besides our many daily tasks, we talk with our hands; we reassure each other with a touch.

In Schwartz's model of how neurons fire when we move, implanted electrodes in the motion sensors of a monkey brain allowed the monkey to perform skillfully with his affected arm. And in humans? Schwartz played a clip of a woman with a degenerative disorder that left her paralyzed from the neck down and unable to feed herself. Scientists wired her up, strapped on a robotic arm and asked her to "imagine you're moving."

They could hear her neurons firing. And then, with her thoughts, she manipulated her robotic arm to grasp a piece of chocolate and eat, unassisted, for the first time in 13 years.

Building bionics. Physiatrist Dr. Todd Kuiken of the Rehabilitation Institute of Chicago spoke on current applications: "You just have to find the clinical heart of the problem and figure out what the patient wants to do.

"Muscle only stays alive a year if you cut a nerve away," he explained. "Nerves stay alive [much longer]. If I have a World War II vet and tap a nerve, he'll feel his missing hand."





Kuiken builds bionics to solve clinical problems.

If neural signals still exist, then the patient's remaining muscles, if healthy, can serve as biological amplifiers. Skin surface can record up to the millivolt range, which can allow a targeted reinnervation.

Consider the case of Jesse the Lineman, who sustained 7,200-volt burns and bilateral shoulder disarticulations, losing both arms down to the sockets. Now, after targeted reinnervation surgery, he has better muscle signals on his chest. These signals are wired to his prosthetic arm, and so to use his hand, he just has to think about using it, Kuiken said.

Other applications include a new custom-made version for women. "We build our own to the 25th percentile female average," said Kuiken. "All are commercially available."

Ninety percent of amputations involve legs, and of these, 90 percent are due to vascular disease (especially diabetes). The next generation of prosthetic legs, developed in an NIH-funded Vanderbilt University project, lets knee and foot move together, without foot drag.

During Q&A, Schwartz said, "For the past 30 to 40 years, scientists thought that one neuron does only one job. Now we know many neurons do many things. This is a tidal shift in how we think about the brain."

If this sounds like a tale of superheroes, that's not science fiction. That's NIH-funded science.

This STEP forum is archived at <http://videocast.nih.gov/summary.asp?Live=11930&bhcp=1>. ⑦

Pre-Move Sale at Foundation Bookstore

The Foundation Bookstore (FAES), located on the B-1 level of Bldg. 10 near the cafeteria, is currently running a 50 percent off Pre-Move Sale on an array of scientific and medical books. The store is refreshing its title base in anticipation of the early summer grand opening of its new location on the main level of Bldg. 10, directly down the hall from Masur Auditorium.

Come and visit the FAES Bookstore at its current location to get first pick of the books. And when you stop by, let employees (Manny, Noelle or Jim) know what new product lines you would like to see offered in the new store.



Walkers take off at the start of last year's Take a Hike Day.

6th Annual NIH Take a Hike Day, June 6

In support of White House initiatives promoting a healthier federal workforce and the Surgeon General's National Prevention Strategy, all employees and contractors are encouraged to participate in the 6th annual "Take a Hike" event. This year the goal is to increase participation to record levels. If you have not participated in this fun lunchtime event in the past, this year is the time to start.

All NIH employees and contractors are invited, Thursday, June 6, from 11:30 a.m. to 1:30 p.m. Walk around the perimeter of the NIH campus (approximately 2.8 miles), rain or shine.

Support your institute/center when you register at www.ors.od.nih.gov/pes/dats/wellnes/hike/Pages/hike.aspx.

There will be water stations located along various points of the walk, but volunteers are needed to man them. Water is supplied and tables will be assigned on a first-come, first-served basis. If you would like to sponsor a water station, contact Michelle Aikens at Aikensm@mail.nih.gov or (301) 402-8180.

All employees and contractors are encouraged to participate, but be sure to obtain your supervisor's approval before registering. Take a Hike Day is a voluntary event.

Individuals with disabilities who need sign language interpreters and/or reasonable accommodation to participate should contact Joy Gaines at gainesj@mail.nih.gov or (301) 402-8180. Requests should be made at least 5 days before the event.

This event is sponsored by the NIH Office of Management, Office of Research Services, Division of Amenities and Transportation Services.

Think DOHS for Safety Training

The Division of Occupational Health and Safety (DOHS) helps preserve a safe and healthful workplace for all employees. DOHS provides training to comply with federal, state and local laws, policies and regulations. As technologies in the laboratory evolve, training must match new situations. For assistance with your concerns or questions regarding safety and health at work, contact DOHS at (301) 496-2346 or visit <https://www.safetytraining.nih.gov>.

FREDRICKSON

CONTINUED FROM PAGE 1



"Love is like an essential nutrient," says Fredrickson. "[These] micro-moments of positivity resonance build bonds, weave the social fabric that creates our community, promote health and arguably are the supreme emotion."

PHOTOS: WAYNE RANDOLPH

Positive Emotions and Psychophysiology Laboratory and an NIH grantee. Among her publications are two books for general audiences, *Positivity* and *Love 2.0*.

NCCAM director Dr. Josephine Briggs noted, "Dr. Fredrickson's work is particularly relevant to two NCCAM areas of scientific interest: mind-and-body practices such as meditation and insights from complementary approaches that could potentially help people adopt and sustain positive behavior change."

Negative emotions are adaptive in the short term, Fredrickson said, as seen in the fight-or-flight response. "Positive emotions, however, are adaptive over the long haul," she said. "They expand our awareness so that we can survive and grow, give us more tools for our survival toolkit and help us become better versions of ourselves." A researcher on positive emotions for the past 25 years, Fredrickson has recently focused on emotions that are shared, especially love.

To begin with, how should we define and understand love? The answer is not simple, nor is it something on which everyone agrees, said Fredrickson. Often, scientists do not define love in ways many nonscientists do. It is neither commitment, a special bond, sexual desire, exclusivity, unconditionality, nor a long relationship, although these can relate to love.

Some key elements arise from the psychology specialties of relationship science and emotion science, Fredrickson said. The first science adds caring, or investment in another person for his or her own sake rather than for selfish ends, and "perceived responsiveness," or the feeling that the other person understands, validates and cares for us.

The second adds biobehavioral components ("emotions are embodied thoughts, equally affecting mind and body at the same time"); a view of caring as a series of moments, "not something you turn on and off like a toggle switch"; and a theory called "broaden and build," which Fredrickson has developed. It holds that positive emotions serve to broaden people's awareness; this, over time, builds enduring resources for living such as relationships and resilience.

Fredrickson's own definition is that love is an "interpersonally situated experience" in which there are momentary increases in several factors: positive-emotion sharing, mutual care and some synchronization of partners' biological and behavioral processes. Other research in the field has

identified some scenarios of this latter synchronization, e.g., between parents and their infants and between people having engaging conversations. Fredrickson's concept is what she calls "positivity resonance—the idea that when two people share a positive emotion, it is unfurling across their two brains and bodies at the same time." In these small moments of sharing, she said, "there is one state and one emotion going on—maybe even a miniature version of a mind meld."

For positivity resonance—and, thus, for love—to occur, Fredrickson argues, two conditions must be met: a feeling of safety, both internal and external, and a "real-time sensory connection," as when people are physically together, have eye contact, touch or hear each other's voices. There is evidence that eye contact, for example, sends neural information to us that provides gut-level wisdom about what someone is trying to communicate to us. "The ways we connect by texting, emailing and messaging may feel good at times," she said, "but do not lead to this experience of resonance."

Some of her recent studies have examined a complementary health approach that might help people generate more of these "micro-moments": a type of meditation called loving-kindness.

One early study found, following this practice, a small upward shift in certain measures of participants' cognitive, social and psychological resources and self-reported health.

Another examined associations between three factors: vagal tone (a biological process of the vagal nerve, which connects the brain to the heart and other internal organs and has regulatory functions); positive emotions; and positive social connections (individual reports of positivity resonance). Her team found that an increase in one of these factors was associated with increases in the others, in a kind of "upward spiral. One way to think about this is that love creates health and health creates love," she said. A study now in press looks at these three factors with the addition of meditation. Another study, with Dr. Steve Cole at the University of California, Los Angeles Geffen School of Medicine, is looking at other mechanisms such as oxytocin and pro-inflammatory gene expression, which may be operating when people experience good effects from a new health behavior and want to repeat it.

Fredrickson offered a summation: "Love is like an essential nutrient. [These] micro-moments of positivity resonance build bonds, weave the social fabric that creates our community, promote health and arguably are the supreme emotion." They can also, she said, create micro-utopias in our day-to-day lives. 🌟

milestones

Completing a 'Storybook' Career

NCI's Hadley Retires After 34 Years at NIH

By Carla Garnett

James Hadley, director of the National Outreach Network in NCI's Center to Reduce Cancer Health Disparities, retired recently after 34 years at NIH.

"My career has been a storybook," he said. "I've been able to reinvent myself over and over again, based on the research needs and educational outreach needs of NIH."

Once upon a time, Hadley started his NIH career in the National Institute of Child Health and Human Development, then moved briefly to the NIH Office of the Director, then on to the National Institute of Allergy and Infectious Diseases with a short sojourn at HHS headquarters and finally, the National Cancer Institute. He recalled every change of pace, considering he never really planned any of them.

Hadley was an adjunct professor—and informal mentor/guidance counselor—teaching communication at Howard University in 1980, when one of his own mentors mentioned a job opportunity at NIH. The post, officially called "public information specialist" in NICHD, would come to define Hadley's career and passion for helping people learn about medical research and its role in disease prevention and improving health. In every job he took thereafter, he had that singular purpose: help inform the public in some way.

Soon after joining NIH, Hadley took the first of several detail assignments in the OD Equal Employment Opportunity Office. "That was the training ground for everything I needed to know for working in the communication community at NIH," he recalled.

Returning to NICHD, he wrote feature articles, supervised exhibit design and worked on news campaigns. From there Hadley was recruited to the NIAID communications office, in the thick of the first stages of the AIDS epidemic.

"I can remember when the stigma was such that folks were scared to even be around people with AIDS," he said. "Our office worked hard on information and educational materials to combat those fears."

Working as a public liaison officer by then, Hadley also led efforts on educating communities about childhood asthma, biosafety lab construction and HIV Vaccine Awareness Day.

In 1994, he was called downtown for a detail as employee communications coordinator for HHS's assistant secretary for personnel administration.

In 1997, he accepted a detail to coordinate an NIH Health Fair for OD's Office of Disease Prevention, while keeping his main post at NIAID.

"We congratulate James on 34 years of service—and that is the important word—service, to NIH and the public," said Calvin Jackson of NIH's Office of Communications and Public Liaison. "In addition to all of his professional accomplishments, the communications community has regarded James throughout his career for his collegiality, his willingness to participate, his ever-kind treatment of [everyone] he worked with and on behalf of across the country. He has made the government a more accessible and friendlier place and he has always listened to the needs of the public."

In 1999, he earned a spot in NIH's Management Cadre Program. He was assigned to the news division of HHS's assistant secretary for public affairs.

By 2003, Hadley's commitment to education and outreach had led him to become advocacy relations manager at NCI. He coordinated a summit, "Listening and Learning Together: Building a Bridge of Trust" and set up "Understanding NCI," a teleconference series highlighting research advances.

By the end of his career, Hadley had established and administered the National Outreach Network (NON), which incorporates culturally and linguistically appropriate education and outreach activities into NCI's community-based health disparities research programs. A cadre of community health educators develops culturally sensitive, evidence-based cancer information tailored to the specific needs and expectations of at-risk and underserved communities.

"Besides my coworkers here, I'll really miss the community health educators," Hadley said. "They are so passionate about what they do. Compassion is definitely a requirement for their work."

Coworkers said that when Hadley announced his retirement, everyone who knew him at NIH was happy for him but sad for themselves, given the loss of such a dedicated, creative and warm colleague. Retirement wishes immediately began flooding his desk. Many expressed appreciation for the support and guidance Hadley provided and lauded his professionalism, patience and tireless advocacy for reducing cancer disparities.

"James was very sincere about his work," said CRCHD director Dr. Sanya Springfield. "He really cared about helping people and put his all into NON. He left his imprint on everything he did."

Dr. Mary Ann Van Duyn, CRCHD Integrated Networks team lead, agreed, noting, "James did an absolutely spectacular job of laying the foundation for NON and he will be missed dearly."

Dr. Brenda Adjei, a CRCHD program director, said, "His commitment to and passion for the work of [community health educators] cannot adequately be put into words."

So what will Hadley do in retirement?

"Get a life!" he said, with a laugh. "I also want to travel and continue with my volunteer work."



With some of his health promotion posters behind him, James Hadley retired after 34 years at NIH.

NIDCR Mourns Lynne Angerer

Dr. Lynne Angerer, chief of NIDCR's developmental mechanisms section, died Mar. 30 after a long illness. Her husband and long-term scientific collaborator is NIDCR scientific director Dr. Bob Angerer.

"We have lost one of our leaders in science—a brilliant researcher, a wonderful colleague, dear friend and mentor to so many of us," said NIDCR director Dr. Martha Somerman. "Lynne's death is an immeasurable loss for NIDCR, for the NIH and for the entire research community. Her scientific contributions are enormously important and have significantly advanced our understanding of the human development process."

Angerer was a world-renowned expert in the field of developmental biology. Using sea urchins, close cousins of vertebrates, she unraveled the core regulatory processes that direct the early development of animal embryos. She led her NIDCR lab to numerous pioneering discoveries. Among these was the revelation that some neurons are of a unique tissue origin, differentiating *de novo* from cells in the gut; this finding was a challenge to prevailing dogma that nerves develop only from another embryonic tissue. Her group also found numerous unexpected complex regulatory interactions that are required to prevent most cells of the embryo from adopting neural fate (Wnt signaling).

One of Angerer's major scientific accomplishments was the microarray she helped develop from the newly obtained sea urchin genome sequence, an important tool for genome-wide screens to identify genes and signaling molecules involved in early embryonic development.

Angerer and her husband were recruited to NIDCR in 2004 from the University of Rochester, where, among many accomplishments, they developed a technique of *in situ* hybridization to detect mRNAs using RNA probes. They applied this approach to determine when and where the early embryonic territories in the sea urchin are established and disseminated this information widely to the research community.

Angerer was an inspiring mentor, training many graduate students and postdocs who went on to their own successful research careers. Her commitment to mentoring began at Rochester, where she had been a senior research associate since 1986 and a research associate since 1978.

Angerer did her postdoctoral work at Caltech in the lab of molecular biologist Norman Davidson. She earned a doctorate in 1973 from Johns

Hopkins University, conducting research on the structure of chromatin using biophysical methods. She received a B.Sc. in 1966 and an M.Sc. in 1967 from Ohio State University.

Angerer is survived by her husband and two children, Jen Angerer of New York City and Mark Angerer of Lakewood, Colo., and many friends.

The family has requested that memorial contributions be made to the National MS Society (www.nationalmssociety.org/donate/index.aspx).

Champion for Scientific Workforce Diversity Longtime MARC Chief Toliver Dies

By Jilliene Drayton

Dr. Adolphus "Tol" Toliver, longtime chief of the NIGMS Minority Access to Research Careers (MARC) Branch, died on Mar. 26 at age 81.

Toliver earned a B.S. in biology from Washington University in St. Louis shortly after the school was desegregated. He went on to Purdue University for a Ph.D. in molecular biology/biochemistry then did postdoctoral research at Kansas State University.

Toliver began his trailblazing professional career as an assistant professor in the department of biochemistry and biophysics at the University of California, Davis, at a time when there were very few African-American researchers. He came to NIH in 1975 as executive secretary of the biochemistry study section at what is now the Center for Scientific Review. His advocacy for those underrepresented in the sciences included recruiting women and underrepresented minorities to serve as study section members. He also mentored many junior scientists on the NIH grant application and peer review process.

In 1994, Toliver became director of the NIGMS MARC program, a position he held until his Jan. 1 retirement.

In that role, he was the driving force behind several institutional training programs aimed at increasing the number of biomedical and behavioral scientists from historically underrepresented population groups. His many contribu-



NIDCR's Dr. Lynne Angerer died Mar. 30 after a long illness.



tions included reshaping the MARC program to focus on outcomes, evaluation and continuous improvement.

“Dr. Toliver was one of the most inspiring colleagues with whom I’ve had the pleasure to work,” said University of Maryland, Baltimore County, president Dr. Freeman Hrabowski. “What made him so impressive was his authentic commitment to helping young people succeed. Because of his own background, he understood that if we give students support and expect the most from them, all things are possible.”

One of Toliver’s most notable accomplishments was development of the Annual Biomedical Research Conference for Minority Students. Now in its 13th year, this highly regarded national meeting brings together more than 3,000 student and other participants from 350-plus colleges and universities. The students gain valuable experience in presenting their research and have many opportunities for career-enhancing interactions with other attendees.

Though Toliver’s impact extended far beyond the gates of NIH, his internal contributions were equally prized. “Dr. Toliver had a wonderful eye for talent,” said Dr. Clifton Poodry, director of the NIGMS Division of Training, Workforce Development, and Diversity (TWD). “The program officers and administrative staff he recruited were highly successful and many have gone on to leadership positions at other institutes or agencies.”

“I was fortunate to work under Dr. Toliver’s leadership,” said TWD program director Dr. Shawn Gaillard. “He valued my opinions, never made me feel like I couldn’t ask a question and genuinely wanted me to be successful in my career. He was like a second father to me.”

During his career, Toliver received numerous honors and awards, including two NIH Awards of Merit, a PHS Special Recognition Award, an NIH Director’s Award and an Equal Employment Opportunity Special Achievement Award. He was also elected an Old Master by his alma mater, Purdue University.

Toliver is survived by his wife, Dr. Jean Toliver, as well as a host of nieces, nephews, great-nieces and great-nephews.

Colleagues and associates also remembered Toliver online at <https://loop.nigms.nih.gov/index.php/2013/04/17/remembering-longtime-marc-branch-chief-adolphus-tol-toliver/#comments>. Donations in his memory may be made to the American Cancer Society or to Friends of the Clinical Center.



Fogarty director Dr. Roger Glass (l) welcomes new advisory board members (from l) Drs. William Tierney, Rebecca Richards-Kortum, King Holmes and George Hill. Not shown are Drs. Michele Barry and Michael Merson.

Fogarty Welcomes New Advisory Board Members

The Fogarty International Center recently welcomed six new advisory board members who will provide guidance on funding awards and other global health activities.

Dr. George Hill is a professor emeritus of pathology, microbiology and immunology at Vanderbilt University and was the medical school’s first associate dean for diversity. He conducted groundbreaking research to advance biomedical science worldwide, resulting in a broader understanding of the tsetse fly-transmitted “African sleeping sickness.”

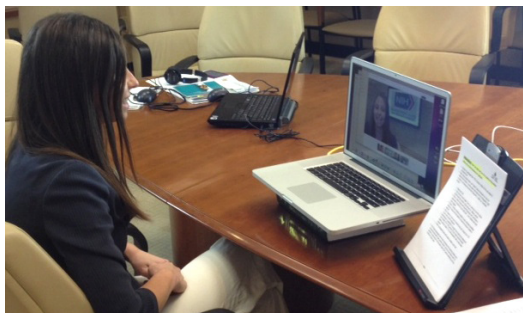
Dr. Rebecca Richards-Kortum is a professor of bioengineering and electrical and computer engineering at Rice University as well as director of the Rice 360° Institute for Global Health Technology. Her work focuses on translating research that integrates advances in nanotechnology and molecular imaging with micro-fabrication technologies to develop inexpensive, portable imaging systems that provide point-of-care diagnosis.

Dr. King Holmes is the William H. Foege chair of global health at the University of Washington, heads the infectious diseases section at Harborview Medical Center in Seattle and is founder and director of the University of Washington Center for AIDS and STD. Holmes is the principal investigator for the International Training & Education Center on Health, a collaboration between UW and the University of California, San Francisco, and one of the largest HIV/AIDS training programs in the world.

Dr. William Tierney is president and CEO of the Regenstrief Institute, Inc., as well as a professor at Indiana University School of Medicine and chief of internal medicine at Wishard Memorial Hospital in Indianapolis. His research focuses on implementing electronic health record systems in hospital and outpatient venues in Indiana and in East Africa.

Dr. Michele Barry is senior associate dean for global health and director of the Center for Innovation in Global Health at Stanford University School of Medicine. As director of the Yale/Stanford Johnson & Johnson Global Health Scholar Award program, she has sent more than 1,000 physicians overseas to help strengthen health infrastructure in low-resource settings.

Dr. Michael Merson is founding director of the Duke Global Health Institute, as well as a professor of medicine, global health, community and family medicine and public policy at Duke University. Previously, he was Yale University School of Medicine’s first dean of public health. 📍



Janet M. de Jesus participates in the Google+ Hangout, addressing myths about hypertension.

PHOTO: NHLBI

NHLBI Supports World Health Day, Hypertension Awareness

In support of World Health Day in April, and its theme of hypertension (high blood pressure), NHLBI collaborated on national and international levels to raise awareness about hypertension and the importance of research in this area.

Dr. Cristina Rabadán-Diehl, acting director of NHLBI's Office of Global Health, participated



Dr. Cristina Rabadán-Diehl speaks at the PAHO World Health Day event.

PHOTO: PAN AMERICAN HEALTH ORGANIZATION

in a panel discussion at the Pan American Health Organization (PAHO) World Health Day event. She discussed the importance of engaging across borders to help manage hypertension.

Last year, the Global Alliance for Chronic Diseases, of which NHLBI is a founding member, launched its first initiative to address hypertension, a major cause of cardiovascular disease, in low- and middle-income countries. Through this landmark research initiative, NIH is funding five research projects. Learn more about this effort at <http://1.usa.gov/Yy5ank>.

Other speakers at World Health Day included Dr. Carissa Etienne, PAHO director; Bill Corr, deputy secretary of the Department of Health and Human Services; Dr. Sonia Angell, senior advisor on noncommunicable diseases at the Centers for Disease Control and Prevention; and Dr. Norman Campbell, president of the World Hypertension League.

In addition, NHLBI participated in its first Google+ Hangout, joining the American Heart Association in addressing myths about hypertension. During the Hangout, Janet M. de Jesus, a nutritionist in NHLBI's Division for the Application of Research Discoveries, joined other panelists to discuss common misconceptions about hypertension and what you can do to prevent or treat the "silent killer." The chat was streamed live and has been archived at www.youtube.com/watch?v=K1OizMHMQPw.

Garden at NIH Is Site for Eagle Scout Project

James Wallenmeyer, 17, completed his Eagle Scout project Apr. 13 on his way to earning the Eagle Scout badge of the Boy Scouts of America.

He and another 30 scouts and leaders from Troop 457 of Rockville descended upon the National Library of Medicine's herb garden. Wallenmeyer's project involved spring cleanup, placement of edging and providing two weather-proof containers for storing gardening supplies and materials.

The garden was created in 1976 for the national bicentennial. Since that time it has been maintained by volunteers from the Potomac chapter of the Herb Society of America (HSA) and volunteers from Montgomery County Master Gardeners. The scout project was coordinated by NLM and the HSA Potomac chapter.



At left: Susan McCall (l) and Ida Wallenmeyer of the Herb Society of America's Potomac chapter join new Eagle Scout James Wallenmeyer and Lynn Mueller, ORF landscape architect (and Eagle Scout). Below, Wallenmeyer (c) is surrounded by fellow scouts and volunteers.

